REMARKS

(1) Claims 21, 22 and 24-32 are pending, of which claims 21 and 24 have been amended and claim 32 has been added. The basis of the amendment in claim 21 is found in cancelled claim 23, and the basis of the amendment in claim 32 is found in page 25, lines 4-16 of the specification.

(2) Applicants' representative appreciates the Examiner about the telephone discussion on August 29, 2007. The following remarks include applicants' separate record of the substance of that discussion.

(3) In the outstanding Office Action dated May 16, 2007, the following rejections are maintained: Claims 21, 22, 25-27 and 29-31 were rejected under 35USC§ 103(a) as being unpatentable over Otsuki ('875) in view of Miyazaki ('617). Claims 23 and 24 were rejected under 35USC§ 103(a) as being unpatentable over Otsuki ('875) and Miyazaki ('617) in view of Ushikoshi ('606). Claim 28 was rejected under 35USC§ 103(a) as being unpatentable over Otsuki ('875) in view of Miyazaki ('617) and Yamana ('374).

(4) In this Response, the Examiner is requested to reconsider the rejection by the reasons as explained in Sections (5) to (12) below.

(5) Ushikoshi's molybdenum carbide layer 44 is not a dielectric material.

Although the Examiner states that "Ushikoshi discloses molybdenum carbide as a stress mitigation layer (page 5 of the outstanding Office Action)," molybdenum carbide is not a dielectric material, so the layer made of molybdenum carbide does not meet the claimed requirement of the "stress mitigation layer."

Moreover, none of molybdenum layer 43, molybdenum carbide layer 44 and molybdenum oxide layer 45 is a "dielectric material." At col. 5, lines 1-3, Ushikoshi discloses that "a resistive heating element 42 having a laminated structure composed of a molybdenum layer 43, a molybdenum carbide layer (MoCx layer) 44 and a molybdenum oxide layer (MoOx layer) 45." If molybdenum, molybdenum carbide and molybdenum oxide are "dielectric material," the "laminated structure" does not serve as a "resistive heating element." Thus, even a combination of the cited reference does not make the invention recited in amended claim 21.

(6) Otsuki's process cannot be replaceable with Miyazaki's screen printing method.

(i) Otsuki does not disclose any method for forming layers by screen printing each of the conducting and insulating regions, as admitted by the Examiner.

(ii) However, the Examiner replaces the Otsuki's ink-jet method or the bubble jet method with the Miyazaki's screen printing method. However, the teaching by Otsuki cannot be replaced with the Miyazaki's screen printing method.

(iii) Otsuki teaches that the conductive layer and insulating layer are sintered each time when the lower layer 22 and the upper layer 24 are formed. *See* paragraph [0243]. On the other hand, claim 21 recites a single step of sintering the first basic layer and the second basic layer.

The reason why Otsuki performs the sintering process each time when the first basic layer and the second basic layer are formed is as follows: Otsuki teaches an ink-jet method or a bubble jet method. As disclosed at paragraph [0242], the drops for the ink-jet or bubble jet method include a solvent. The amount of the solvent included in the Otsuki's "drops" is much greater than that of the Miyazaki's "ceramic paste" (paragraph [0062] of Miyazaki). The "ceramic paste" for forming ceramic green sheet as disclosed by Miyazaki is much more viscous than the drops used in the ink-jet or bubble jet method. Thus, if the upper layer 26 is continuously formed by an ink-jet method or a bubble jet method without sintering the lower layer 22, the patterns of the first conductive layer 20 and insulating layer 26 in the lower layer 22 dissolve by the solvent included in the upper layer 24. This dissolving is uncontrolled and results in disordering the patterns of the lower layer 22 as well as upper layer 24. Thus, Otsuki requires the conductive layer and insulating layer to be sintered each time when the lower layer 22 and the upper layer 24

are formed. The Examiner states that Otsuki discloses forming directly on top of an individual layer, a second layer comprised of multiple regions and multiple materials, but in order to do so, the sintering process must be intervened before forming the upper layer 24. In other words, the first layer 22 must be sintered first, and then the upper layer 24 can be formed subsequently. Otherwise, the patterns of the lower layer 22 as well as upper layer 24 are disordered by the solvent included in the upper layer 24. Thus, Otsuki teaches sintering the first basic layer before forming the second basic layer. Modification of Otsuki into a single sintering step makes the Otsuki's interconnect substrate inoperable.

(iv) On the other hand, each of the Miyazaki's ceramic green sheets cannot be sintered separately. In Miyazaki, the sintering process is applied after the lamination product of ceramic green sheets are formed. If each of the lower layer and the upper layer for fabricating the ceramic substrate is separately sintered, thereby separately sintered layers cannot be appropriately integrated to form a final product. Thus, Miyazaki teaches laminating "ceramic green sheet," which is not sintered. *See* paragraph [0062]. Miyazaki's screen printing method needs to perform a single sintering process.

(v) Thus, the Otsuki's sintering processes in the ink-jet or bubble jet method cannot be applied to the lamination of ceramic green sheets as disclosed by Miyazaki. As explained above, in Otsuki, each of the lower layer 22 and upper layer 24, formed by an ink-jet or bubble

jet method, needs to be sintered each time when these layers are formed. On the other hand, each of the Miyazaki's ceramic green sheets cannot be sintered before the lamination product of ceramic green sheets are finally formed. Thus, the Otsuki's ink-jet or bubble jet method cannot be replaced with the Miyazaki's screen printing method.

(7) None of the cited references teaches the claimed "base" on which the screen printing is carried out.

Otsuki does not disclose the claimed "base." Thus, the Examiner relies on Miyazaki as to the claimed "releasing" step. The Examiner's understanding that Otsuki does not disclose the claimed "base" is correct because Otsuki's substrate 10 is not released from e.g. conductive layer 20 or insulating layer 26. *See* paragraphs [0240], [0242] and [0243]. In Otsuki, the substrate 10 serves as a support for the conductive layer 20. Removal or release of the substrate 20 from conductive layer 20 or insulating layer 26 makes the invention inoperable. None of the layers formed over the substrate 10 (e.g., upper layer 24) can serve as the claimed "base.". Thus, Otsuki does not disclose the claimed "base."

However, Miyazaki, on which the Examiner relies, does not meet the requirement of the claimed "base." In Miyazaki, the ceramic green sheet 2 is formed "by means of doctor blade process or a similar process" on a support which can be peeled off. *See* paragraphs [0060] and

[0064]. The ceramic green layer 5 is formed by screen printing onto the ceramic green sheet 2. *See* paragraph [0062]. In other words, Miyazaki teaches a ceramic green sheet 2 formed by a doctor blade on a support, the support being peeled off from the ceramic green sheet 2; and a ceramic green layer 5 formed by screen printing on the ceramic green sheet 5. Thus, Miyazaki does not disclose screen-printing the ceramic green layer 5 directly on the support.

On the other hand, claim 21 recites screen-printing the first dielectric material and the second dielectric material on the base; and releasing the first dielectric material and the second dielectric material (included in the first basic layer). Thus, the screen-printing method disclosed by Miyazaki is different from the present invention at least because the base on which the screen printing is performed does not meet the claimed requirement.

Thus, even a combination of the cited references does not make the claimed "base." There is no motivation to modify the teaching by the references into the claimed requirement.

(8) None of the cited references discloses forming different dielectric materials to form an individual layer.

The Examiner states that Otsuki discloses forming multiple regions on an individual layer of different materials. However, Otsuki's disclosure is to form a first conductive layer 20 and an

insulating layer 26 to form an individual layer (lower layer 22). *See* paragraphs [0242]-[0243]. Miyazaki's disclosure is also to form an internal electrode 1 and a ceramic green layer 5 to form an individual layer. *See* paragraph [0062] and Fig. 4.

In this respect, the Examiner states that Otsuki and Miyazaki place no limit on the number of regions which could be screen printed on one layer. Page 5 of the Office Action dated May 16, 2007. However, neither Otsuki nor Miyazaki discloses forming unlimited number of the regions of distinct dielectric materials. Rather, the teaching by Otsuki or Miyazaki is to form a dielectric layer of the same dielectric material to form an individual layer.

On the other hand, the claim recites screen-printing a first dielectric material and a second dielectric material to form an individual layer. As clearly recited, the first dielectric material has a dielectric constant different from that of the second dielectric material.

Thus, even a combination of cited references does not make the formation of an individual layer including multiple regions of distinct dielectric materials.

(9) The Examiner rejected claims 23 and 24 because Ushikoshi discloses placing a protective or stress mitigating layer between different material to reduce the likelihood of cracks or other problems in the laminated piece. Page 5 of the Office Action dated May 16, 2007. The

Examiner considers that molybdenum carbide layer 44 or molybdenum oxide layer 45 disclosed by Ushikoshi corresponds to the claimed "stress mitigation layer."

However, because the heater disclosed by Ushikoshi is not a ceramic "substrate," the molybdenum carbide layer 44 or molybdenum oxide layer 45 cannot be formed by the ink-jet or bubble jet method disclosed by Otsuki, or the screen printing method disclosed by Miyazaki. Claim 21 recites "for forming a ceramic substrate." Please note that the Ushikoshi's resistive heating element has a spirally coiled body (col. 5, lines 35), which is not a "substrate." Thus, there is no motivation to combine Ushikoshi with Otsuki and Miyazaki.

(10) Ushikoshi ('606) discloses a ceramic heater. *See* the title of Ushikoshi. The teaching by Ushikoshi does not relate to the ceramic electronic component taught by Miyazaki and the interconnect substrate taught by Otsuki. One skilled in the art in the field of Miyazaki or Otsuki does not refer to the teaching of Ushikoshi because it is irrelevant to the present invention.

(11) Ushikoshi does not disclose the features of claim 24.

Ushikoshi teaches a heat generator body 43 made of molybdenum, a molybdenum carbide layer 44 and a molybdenum oxide layer 45 (col. 8, lines 28-35), and substrate of aluminum nitride (col. 5, lines 23-24). These compounds are chemically and structurally different. In

particular, molybdenum carbide and molybdenum oxide are carbide and oxide of molybdenum, but this does not mean that molybdenum carbide and molybdenum oxide include a metal of molybdenum as a component.

Claim 24 recites that the fifth dielectric material for the stress mitigation layer comprises at least one component of the first dielectric material and at least one component of the second dielectric layer. For example, as understood from page 18, lines 17-21 of the specification by one skilled in the art, the material composition of the stress mitigation layer partially corresponds to both of the high dielectric layer and the base dielectric layer. Even if Ushikoshi, *per se*, discloses a layer serving as a stress mitigation layer in the disclosed heater, Ushikoshi's composition of the stress mitigation layer is different from the invention of claim 24.

Thus, claim 24 is not obvious over the references.

(12) Regarding newly added claim 32, none of the cited references discloses another stress mitigation layer of a dielectric material between the second region and the fifth region of the base.

(13) In view of the aforementioned amendments and accompanying remarks, Applicants submit that that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned representative at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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